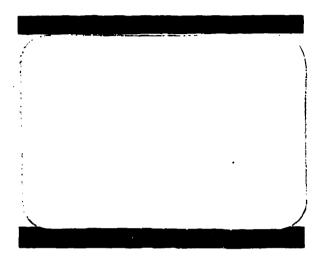
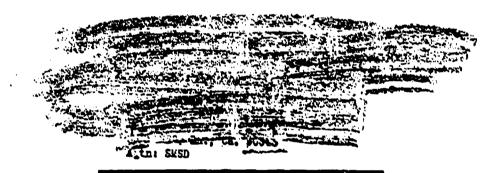
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# CONVAIR ASTRONAUTICS

CONVAIR DIVISION OF GENERAL DYNAMICS CORPORATION

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FUNCTIONAL TEST OF LIQUID OXIGEN

TANKING UNIT 7-29207-3

(MODEL 5141) S/N AA-9A

REPORT NUMBER 2781230-1

CONVAIR-ASTRONAUTICS

MAY 19 1981

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# GLOSSARY OF ABBREVIATIONS

GPM = Gallons per minute

PSIG = Cauge pressure in pounds per square inch

OF = Temperature in degrees Fahrenheit

102 = Liquid oxygen

PCS = Performance check sheet

LA = LO<sub>2</sub> Pump A

LB = LO<sub>2</sub> Pump B

LC = LO, Pump C

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#### INTRODUCTION:

Due to the disessembly and rework of the Oxidizer Tanking Unit (S/N AA-9A), it was deemed necessary to perform a functional checkout of the unit after reasonbly.

#### CRJTCT:

The object of this test is to conduct a functional checkout of the Liquid Oxygen Tanking Unit (S/N AA-9A) and see that it meets the specifications as set forth on Pages 11, 12, and 13 of the PCS 342-A.

These specifications include the following: Amp IC shall pump at a minimum rate of 10 gpm against a head pressure of 14 to 36 pair depending on the external throttle valve position and pump speed. Pump IC shall pump at least at a rate of 250 gra against a head pressure of 18 to 40 pair depending on the external throttle valve position and pump speed. Pumps LA and LB shall pump at a minimum rate of 500 gpm each against a head pressure of 70 paig.

#### CONCLUSION:

The unit performed satisfactorily and mut the specifications set forth in the PCS.

#### RECOME DATIONS.

- 1. It is recommended that components disassembled or removed during rework of future tanking units undergo bench obeoks prior to installation.
- 2. 34-76 Casket Material should be used in place of Teflon whorever possible.

# THEST PROCEDURES

for the test procedure refer to the RCS and the Systems lest labs standard procedure for operating the Liquid Oxygen Tenking Unit at Point Long Test Site.

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#### RESULTS:

During checkout and leak check of the unit many problem areas arose. Several pressure regulators were found to be defective during the pressurization of the pressuring time pressurization of the pressuring timestigation it was found that at least one of these regulators was installed backward. Also, several of the swage lock fittings leaked and had to be replaced.

Valve IB-3 (reference Figure 1) did not function correctly on initial checkout. It was determined that a faulty cylinder seal was the cause. The sciencid for Valve IB-2 leaked around the seat and had to be replaced. Valve IC-1 was assembled improperly and required rework.

The valve position potentiometer on this valve was installed incorrectly and the limit switch circuit had to be rewired.

During leak checks it was discovered that 4 flange seals leaked badly. It was recommended that the Teflox gasket material in these flanges be replaced with D4-76. The recommendation was accepted and the gaskets were replaced. A leak check was then performed and the unit was found to be leak free.

Typical curves of flow rates, inlet pressures and temperatures, and outlet pressures and temperatures are shown in Figures 2, 3, 4, and 5.

The first run was made with Pump IC only. The flumeter at the exit of Pump IC malfunctioned early in the test and accurate flow-rate data could not be taken. However, the flourate was approximately determined by monitoring the liquid level of the tank into which the pump was oxiderating. The following values were obtained during this run: Flourate = 250 GM, Inlet Pressure = 13.5 paig, Inlet Tumperature = -293.2 T, Pump IC Outlet Pressure = 23.5 paig, Unit Outlet Pressure = 14 paig, and Unit Outlet Tumperature = -292.5 T.

The next ron was made with Pumps IA, IB, and IC all running. Some trouble was encountered beeping the pumps primed no the storage tank pressure was reised to 35 paig. The following steady state conditions were reached: Flourates 1320 GFM, Inlet Pressure = 20.5 paig, Inlet Temperature = 292.707, Pump IC Outlet Pressure = 66.5 paig, Unit Outlet Pressure = 52 paig, Unit Outlet Temperature = -291.507.

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# RESULTS: (Continued)

The tanking unit was set up for back flow and Pump LC was turned on. After approximately seven minutes of run time the drive belt in the Varidrive unit of Pump LC failed and the pump was shut down. Detanking was continued pneumatically. The steady state conditions attained while Pump LC was operating were the following: Inlet pressure 16.2 psig, Inlet temperature = -284.7°F, Pump LC outlet pressure = 44 psig, Unit cutlet pressure = 36 psig, Unit outlet temperature = -284.5°F. For this run the inlet of the tanking unit is actually on the outlet side of Pump LC and vice versa.

A final run was made with Pumps L4 and L8 both running. The steady state values obtained were: Flowrate 1025 gpm, Lilet pressure = 18.4 paig, Inlet temperature = -291.5°F, Unit outlet pressure = 58.5 paig, and Unit outlet temperature = -290°F.

NOTE: The test data from which this report was prepared are recorded in Engineering Test Laboratories Data Book Humber 7292.

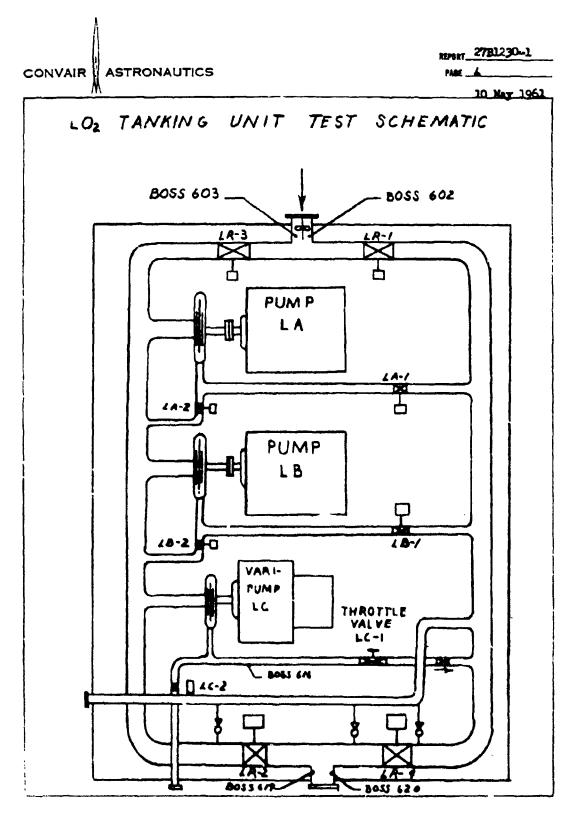
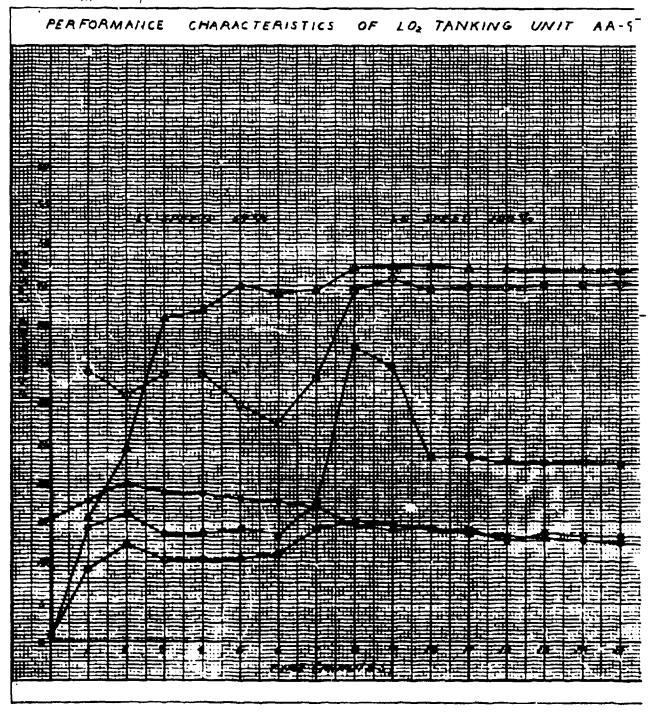


FIGURE 1



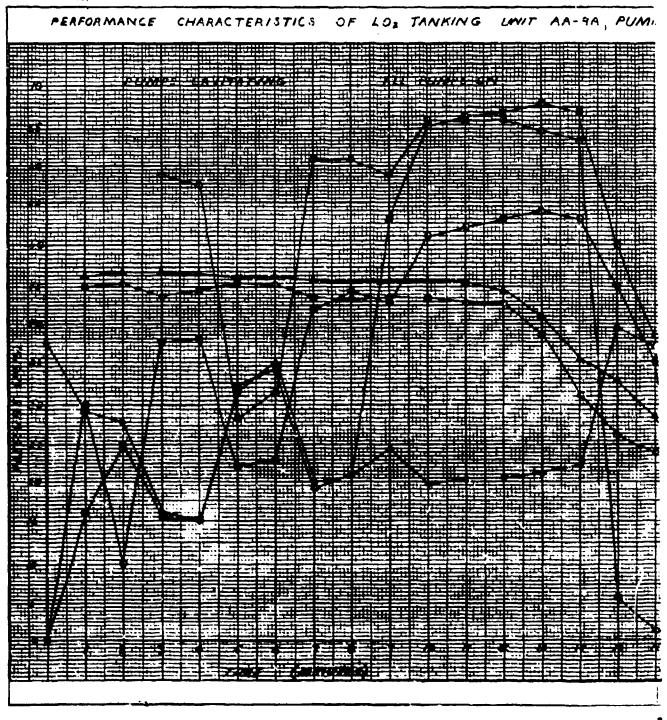
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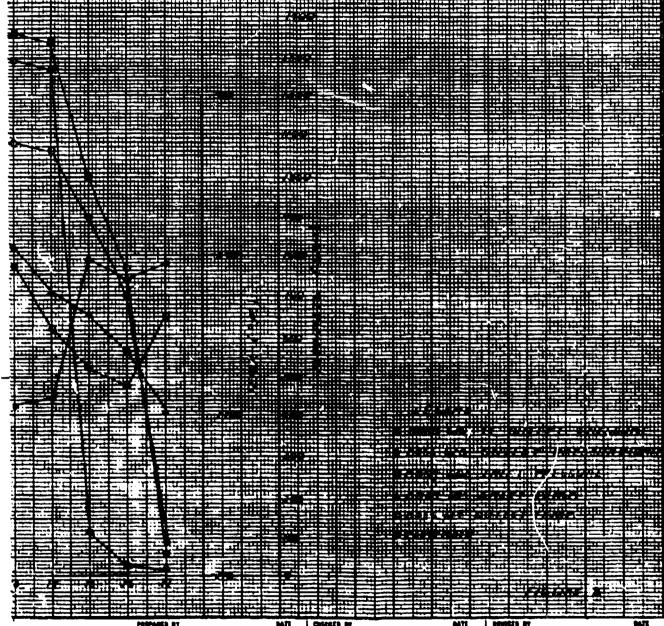


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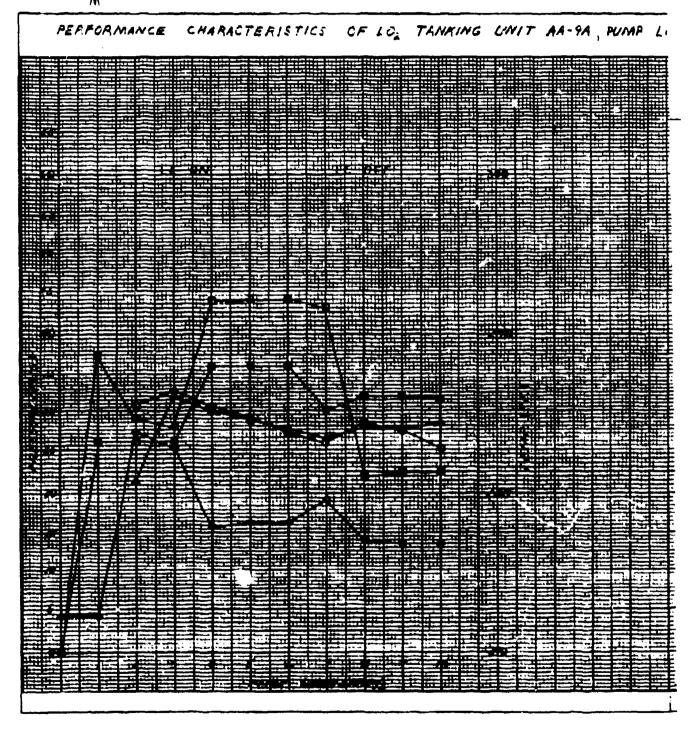
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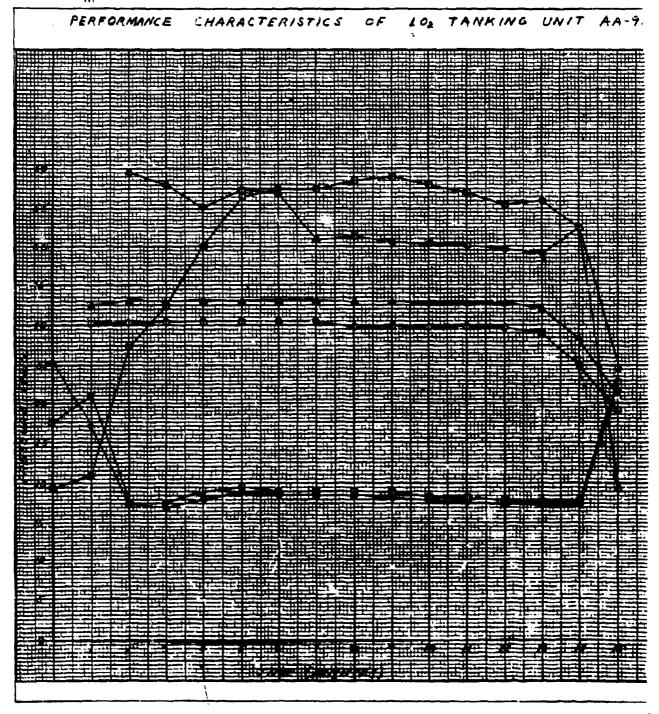
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